

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of June 19, 2003 is respectfully requested.

As an initial matter, the Examiner is requested to note that dependent claims 18 and 21 have been slightly amended in order to make several minor formal corrections. In addition, new dependent claims 33-36 have been added so as to further distinguish the present invention from the prior art.

Claims 17-32 were pending in this application and treated by the Examiner in the outstanding Office Action. In this regard, the Examiner has rejected claims 17, 19-24, 26, and 28 under 35 USC § 103 as being unpatentable over the Pimpinella reference (USP 5,257,332); has rejected claims 18, 25, and 31 under 35 USC § 103 as being unpatentable over the Pimpinella reference in view of the Tabuchi reference (USP 5,481,629); has rejected claim 29 as being unpatentable over the Pimpinella reference in view of the Tabuchi reference, and further in view of the Ham reference (USP 5,543,255); and has rejected claim 32 under 35 USC § 103 as being unpatentable over the Pimpinella reference in view of the Tabuchi reference, and further in view of the Matsumura reference (USP 5,625,493). However, the Examiner's prior art rejections are respectfully traversed and, for the reasons discussed below, it is respectfully submitted that the claims are clearly patentable over the prior art of record.

The present invention has been developed in order to simplify the alignment of a lens element with an optical element on a separate substrate. Specifically, the optical device comprises an optical substrate, a lens element formed on the optical substrate, an optical element, and a supporting substrate supporting the optical element. The supporting substrate has a grooved surface with a groove formed therein, and the optical substrate has a projecting part resting within the groove formed in the grooved surface of the supporting substrate so as to align the lens element with the optical element. As a result of this arrangement, the optical element can be quickly and accurately aligned with the lens element by simply mating the projecting part of the optical substrate with the groove of the supporting substrate (i.e., resting the projecting part within the groove).

The Pimpinella reference discloses an optical fiber expanded beam coupler including two optical substrates 10, 11 and a coupler 22. Each of the optical substrates supports an end of an optical

fiber 18, as well as supporting a lens element 20. As illustrated in Figure 2 of the Pimpinella reference, the coupler 22 is positioned over the optical substrates 10, 11 so as to sandwich the ends of the optical fibers 18 and the lens elements 20 between one of the optical substrates 10, 11 and the coupler 22.

The Examiner asserts that the coupler 22 corresponds to the supporting substrate of the present invention. Furthermore, the Examiner explains that the coupler 22 has a “groove” 27, 28 formed therein, and that the optical substrate 11 has a projecting part 31, 32 that rests in the “groove.” However, elements 27 and 28 of the coupler 22 are not *grooves*, and it is submitted that the Pimpinella reference does not disclose or suggest a groove in a supporting substrate in which a projecting part of an optical substrate rests. In this regard, the Examiner’s attention is directed to column 2, line 31 through column 3, line 10 of the Pimpinella reference, which describes elements 27 and 28 as “wells” rather than grooves. In this regard, Webster’s Ninth New Collegiate Dictionary defines a “groove” as a long narrow channel or depression, while a “well” is defined as a deep vertical hole. Moreover, the Pimpinella reference itself uses the term “groove” to describe the elongated channels 13, 17, 24 shown in Figure 1, and uses the term “well” to describe the holes 19 and 27-30. Consequently, it is submitted that the Pimpinella reference does not disclose or suggest a projecting part resting within a *groove* formed in a grooved surface of a supporting substrate, as recited in independent claim 17.

Moreover, independent claim 17 recites that the supporting substrate supports an optical element. However, the coupler 22 of the Pimpinella reference clearly does not support *any* components, as illustrated in Figure 2. In contrast, as explained above, each of the optical substrates 10, 11 supports a lens element 20 and the end of an optical fiber 18. The coupler 22 is merely positioned over the lens elements 20 and the ends of the optical fibers 18, as also illustrated in Figure 2. Consequently, it is submitted that the Pimpinella reference also does not disclose or suggest a supporting substrate supporting an optical element as recited in independent claim 17.

The Tabuchi reference, the Matsumura reference, and the Ham reference also do not, either alone or in combination, disclose or suggest a supporting substrate having a grooved surface with a groove formed therein, in which a projecting part of an optical substrate rests within the groove

formed in the grooved surface as recited in independent claim 17. Therefore, one of ordinary skill in the art would not be motivated by these references to modify the Pimpinella reference or to combine the references in a manner that would result in the invention recited in claim 17. Accordingly, it is respectfully submitted that independent claim 17 and the claims that depend therefrom are clearly patentable over the prior art of record.

The Examiner's attention is directed to amended dependent claim 31 and new dependent claims 33-36, which recite further distinctions between the present invention and the prior art. In particular, new dependent claim 33 recites that the lens element is *fixed* to the optical substrate, and new dependent claim 35 recites that the lens element and the projecting part are *fixed* to the optical substrate. As a result, there are fewer components that can possibly be misaligned, thereby reducing the possibilities for error. In contrast, the Pimpinella reference explains that an alignment sphere 31 (i.e., a "projecting part," as interpreted by the Examiner) is placed in each well 29, while an alignment sphere 32 is placed in each of the wells 30, and the alignment spheres 32 are directed into the respective wells 27, 28 when coupler 22 is positioned over the optical substrates 10, 11 (see column 3, lines 11-40). In other words, the spheres 31, 32 are separate and unattached components that are simply held within respective wells. Thus, the Pimpinella reference does not disclose or suggest a lens element and/or a projecting part fixed to an optical substrate, as recited in claims 33 and 35. In addition, the Tabuchi reference, the Ham reference, and the Matsumura reference also do not disclose or suggest the features recited in dependent claims 33 and 35.

Furthermore, it is clear that the Pimpinella reference also does not disclose or suggest an optical substrate and a lens element and/or a projecting part that are *integrated to form a one-piece unit*, as recited in claims 31, 34, and 36. In addition, the Tabuchi reference, the Ham reference, and the Matsumura reference also do not disclose or suggest the features recited in dependent claims 31, 34 and 36.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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